

REMARKS

Claims 27 and 33 are amended. Claims 23-26, 28-32 and 34-35 are cancelled. New claims 36-37 are added. Claims 27, 33 and 36-37 are pending in the application.

Each of claims 23-25, 27 and 29-33 stand rejected under 35 U.S.C. § 102 as being independently anticipated by any of Yao, U.S. Patent No. 6,133,613; Shrivastava, U.S. Patent No. 5,994,730 and Havemann, U.S. Patent No. 5,482,894. Without admission as to the propriety of the rejection, claims 23-25 and 29-32 are cancelled. A proper anticipation rejection requires each and every limitation of a rejected claim to be disclosed in a single prior art reference. Claims 27 and 33 are allowable over each of Yao, Shrivastava and Havemann for at least the reason that not one of the three cited references discloses each and every element in either of those claims.

As amended, independent claim 27 recites a gate stack having a layer comprising $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ in physical contact with a metal silicide layer over a semiconductive substrate, wherein x is from 0.39-0.65, y is from 0.02-0.56, and z is from 0.05 to 0.33. The amendment to independent claim 23 incorporates the subject matter of claims 28 and 31. Claims 28 and 31 are appropriately cancelled. Applicant notes that claim 28 was rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over any one of Yao, Shrivastava and Havemann as combined with Lin, U.S. Patent No. 5,883,011. Accordingly, the discussion of amended claim 27 set forth herein addresses each of Yao, Havemann and Shrivastava independently and as combined with Lin.

As noted by the Examiner in the present action, each of Yao, Shrivastava and Havemann discloses a layer comprising silicon, nitrogen and oxygen on a silicide layer. However, as additionally noted by the Examiner at pages 5-7, not one of Yao, Shrivastava

or Havemann disclose the claim 27 recited $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ wherein x is from 0.39-0.65, y is from 0.02-0.56, and z is from 0.05 to 0.33. Applicant further notes that not one of Yao, Shrivastava and Havemann disclose any relative amounts of silicon, nitrogen and oxygen in the silicon oxynitride layers disclosed therein, and therefore do not suggest the claim 27 recited values. The Examiner states that the claim 27 recited ranges of relative values of silicon, nitrogen and oxygen (as formerly recited in claim 28) would be obvious because Lin teaches a silicon oxynitride layer having silicon, nitrogen and oxygen ratios within the ranges recited in the present claim. Applicant disagrees.

Lin discloses formation of a silicon oxynitride layer on a sacrificial layer of titanium nitride (col. 4, ln. 22-24). Lin further discloses a subsequent patterning followed by removal of the sacrificial titanium nitride layer and the silicon oxynitride layer (col. 4, ln. 56 through col. 5, ln. 44; and Fig. 3). Applicant notes that the silicon oxynitride layer disclosed in Lin is sacrificial and is not present in any final constructions. Further, Lin does not disclose or suggest the claim 27 recited $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ layer on a metal silicide layer.

As indicated in applicant's specification at, for example, page 2, line 19 through page 3, line 20; and page 10, lines 3-10, the claim 27 recited $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ layer is present in the final gate structure and can function as an insulative layer and to alleviate stress from adversely impacting underlying conductive layers. The use of a sacrificial silicon oxynitride layer having the recited silicon nitrogen and oxygen ratios as disclosed in Lin in no way suggests utilization of any silicon oxynitride comprising layer in a final structure. Accordingly, any of Yao, Shrivastava and Havemann in combination with Lin fail to disclose or suggest the claim 27 recited $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$ layer in physical contact with a metal silicide layer in a gate stack, wherein x is from 0.39-0.65, y is from 0.02-0.56 and z is from 0.05-

0.33. Independent claim 27 is therefore allowable over the cited combinations of Lin and any of Yao, Havemann and Shrivastava.

Dependent claim 33 is amended to properly depend from claim 27. Claim 33 is allowable over the cited combinations of any of Yao, Havemann and Shrivastava in view of Lin for at least the reason that it depends from allowable base claim 27.

Claims 26, 28 and 34-35 stand rejected under 35 U.S.C. § 103 over any of Yao, Havemann and Shrivastava in view of Lin. Without admission as to the propriety of the Examiner's rejection, claims 26, 28 and 34-35 are cancelled.

New claims 36 and 37 do not add "new matter" to the application since each is fully supported by the specification as originally filed. Claims 36 and 37 are supported by the specification at, for example, page 9, line 15-19; and the claims as originally filed.

For the reasons discussed above, claims 27 and 33 are allowable, and claims 36-37 are believed allowable. Accordingly, applicant respectfully requests formal allowance of claims 27, 33 and 36-37 in the Examiner's next action.

Respectfully submitted,

Dated: 8-23-2002

By: Jennifer J. Taylor

Jennifer J. Taylor, Ph.D.
Reg. No. 48,711

Application Serial No.09/559,903
Filing DateApril 26, 2000
Inventor..... Zhiping Yin et al.
Assignee.....Micron Technology, Inc.
Group Art Unit.....2815
Examiner Eckert II, George C.
Attorney's Docket No.MI22-1427
Title: Circuitry and Gate Stacks

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
RESPONSE TO MAY 24, 2002 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

27. (Amended) A gate stack, comprising:
- a polysilicon layer over a semiconductive substrate;
 - a gate oxide layer on the polysilicon layer;
 - a metal silicide layer on the gate oxide layer ~~over the polysilicon layer;~~
 - a layer comprising $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$, ~~silicon, oxygen and nitrogen over~~ and in physical contact with the metal silicide, wherein x is from 0.39 to 0.65, y is from 0.02 to 0.56, and z is from 0.05 to 0.33; and
 - a silicon nitride layer on ~~over~~ the layer comprising $\text{Si}_x\text{N}_y\text{O}_z\text{:H}$, ~~silicon, oxygen and~~ nitrogen.

33. (Amended) The gate stack of Claim 27, where the layer comprising Si_xN_yO_z:H ~~silicon, oxygen and nitrogen~~ has a thickness of from about 250Å to about 650Å.

36. (New) The gate stack of claim 27 wherein y is from 0.02 to less than 0.1.

37. (New) The gate stack of claim 27 wherein x=0.5, y=0.37 and z=0.13.

--END OF DOCUMENT--